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OFFICE OF ELECTRICITY DELIVERY AND ENERGY RELIABILITY

OVERVIEW

Chairman Biggert and members of the Subcommittee, thank you for the opportunity to testify today on the science and technology priorities for Fiscal Year (FY) 2006 within the newly established Office of Electricity Delivery and Energy Reliability.

The Office of Electricity Delivery and Energy Reliability, referred to as the Office of Electric Transmission and Distribution (OETD) within the FY 2006 budget request, resulted from the consolidation of several programs within the Department. Consistent with the Conference Report to the Consolidated Appropriations Act of 2005, the Energy Security and Assurance Program activities were merged with those of OETD. In addition, the Import/Export Authorization (IEA) electricity activity was transferred from the Department's Office of Fossil Energy under the Interior and Related Agencies Appropriation to OETD under the Energy and Water Development Appropriation.

The mission of the Office of Electricity Delivery and Energy Reliability (OE) is to lead national efforts to modernize the electricity delivery system, to enhance the security and reliability of America's energy infrastructure, and to facilitate recovery from disruptions to energy supply. This is vital to the Department's strategic goal to protect our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally sound energy.

The Administration has requested $95.6 million for OE in FY 2006. This includes $71.8 million for research and development activities, $12.4 million for electricity restructuring activities, and $11.4 million for Program Direction funds to provide for programmatic management and to enable the Department to execute its sector-specific responsibilities under Homeland Security Presidential Directive (HSPD) 7 – "Critical Infrastructure Identification, Prioritization, and Protection" and its emergency support responsibilities as mandated by HSPD 8 – "National Preparedness".

RESEARCH AND DEVELOPMENT

The Research and Development (R&D) program within OE, which will contribute to the modernization of the electricity system, consists of six main activities that are continuing from FY 2005: High Temperature Superconductivity; Transmission Reliability; Electric Distribution Transformation; Energy Storage; GridWise; and GridWorks.

The High Temperature Superconductivity activity supports development of second generation wire that is usable in cables, generators, transformers, and motors – equipment that crosscuts the entire electric power value chain. High temperature superconductors are a good example of advanced materials that have the potential to transform electric power delivery in America. The prospect of transmitting large amounts of power through compact underground corridors, with minimal electrical losses over long distances, could significantly enhance the overall energy efficiency and reliability of the electric system. In addition, high temperature superconductors have the potential for revolutionizing a variety of military propulsion and directed energy weapon applications where high power density, as well as reduced size and weight at reasonable cost, is absolutely essential.

The Transmission Reliability R&D activity supports modernization of the Nation's transmission infrastructure through technologies that provide enhanced grid reliability and efficient electricity markets under competition. The Transmission Reliability activity focuses on developing real-time monitoring and control software tools and system operating models for grid operators, and market design research, including demand response integration, to support restructured markets development. An example of this ongoing effort is the Eastern Interconnection Phasor Project (EIPP). The EIPP is a network of time-synchronized data recording instruments that monitor the equivalent of the grid's heartbeat and blood pressure in near real-time. It provides early warning about possible disturbances, while they are still manageable.

The Electric Distribution R&D activity supports R&D that will enable the development and testing of advanced technologies and standards for interconnection of distributed energy resources into the electricity grid. This technology will allow the full integration of distributed resources into distribution operations, and lead to increased asset utilization and enhanced system reliability for the entire national electrical system.

The Energy Storage R&D activity includes research in advanced energy storage devices for applications ranging from power quality for digital facilities to voltage support for transmission lines. The Energy Storage activity emphasizes the design of storage systems with integrated power electronics and controls that are dedicated to improving

the reliability of the grid, including mitigation of grid congestion and increasing grid stability by reducing the incidence of power quality disturbances.

GridWise denotes a modernized electric infrastructure framework where open, but secure, communication and information technologies, and associated standards and protocols, are used throughout the electric grid to enhance reliability and robustness, promote economic efficiencies, and provide value and choices to electricity consumers. The GridWise activity (software-centric) comprises the intelligence – or brains – behind a modern electric grid that incorporates GridWorks (hardware-centric) technology.

The GridWorks activity focuses on advanced equipment applications. GridWorks uses the facilities at DOE's national laboratories to accelerate the development and testing of advanced conductors, which can increase much needed transmission line capacity. It complements GridWise's architectural software development by developing and demonstrating associated hardware, such as sensors. GridWorks pursues advanced power electronic breakthroughs to develop new transformers, breakers, and current limiters, to provide faster means of limiting transmission problems before they propagate through the electric system.

ELECTRICITY RESTRUCTURING

The Electricity Restructuring program provides technical assistance and analytical support to States and regions for policies, market mechanisms, and activities that facilitate competitive, reliable, environmentally sensitive, and customer-friendly wholesale and retail electric markets. This program includes modeling and analysis to identify the causes of reliability events, and development and implementation of policy-related recommendations for avoiding such future events.

The Electricity Restructuring program also includes activities formerly assigned to the Office of Energy Assurance. The President has designated the Department of Energy as the Lead Sector-Specific Agency responsible for protecting the Nation's critical energy infrastructure, and this program is responsible for coordinating and carrying out the Department's obligations to support the Department of Homeland Security in this important national initiative.

MOVING RESEARCH INTO THE MARKETPLACE

I would like to turn now to discuss moving the research into the marketplace. There are several barriers to the acceptance of new electricity transmission and distribution technologies. These include the capital intensive nature of grid assets, the long life-span of transmission infrastructure which results in a slow turnover process, utility reluctance to invest in new technologies until their durability is ensured, hesitation to make investments until the future structure of the electricity sector is known, difficulties in siting new infrastructure, and permitting delays.

While DOE conducts research, development, field testing, and demonstration of technologies that will facilitate modernization of the grid, as well as identifies and addresses public policy issues that impact grid modernization, the private sector (as well as public power) must make the necessary infrastructure investments to actually modernize the grid. It is a complicated process that will require unprecedented levels of cooperation among the electric power industry's diverse stakeholders. The Federal Energy Regulatory Commission has recently taken action on a case-by-case basis to authorize transmission rate incentives that can provide greater certainty to investors and thus encourage quicker, appropriate investments in grid improvement.

OE has made progress as well – pursuing dialogue with industry, shaping a shared vision of the future, and identifying a pathway to get us there. The Office is working with State commissions to familiarize them with the new grid technologies and the extent to which their reliability has been demonstrated. Although DOE has made progress, much more progress needs to be made.

Modernization of our aging energy infrastructure will help reduce the risk of large-scale blackouts and minimize transmission bottlenecks. The Administration commends the House for again passing energy legislation which includes an electricity title that will achieve many of the Administration's policy objectives to improve reliability, protect consumers, increase supply, and promote efficient markets.

Although I only identified a few key projects, there are many beneficial technologies that are ready to be deployed. But what is lacking is industry certainty on what a "restructured" electricity sector will look like in the future. This can be overcome by repealing outdated rules that discourage investment in new infrastructure, as the recently passed energy bill will do, and by encouraging the development of new technologies to make the grid more efficient, reliable, and secure.

I thank you for the opportunity to testify today. I look forward to working with you to make progress in these critical areas. Madam Chairman, this concludes my testimony and I would be happy to respond to any questions from the Committee.